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NO. 7388 P. 3

Application No.: 10/536498

AUG 05 2005

Docket No.: 13156-00011-US

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Patent Application of:
Marco Bosch et al.

Application No.: 10/536498

Confirmation No.: @@@

Filed: May 25, 2005

Art Unit: N/A

For: CONTINUOUS PREPARATION OF
ALKYLAMINES

Examiner: Not Yet Assigned

**TRANSMITTAL OF TRANSLATION OF INTERNATIONAL PRELIMINARY
EXAMINATION REPORT**

MS Missing Parts
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Dear Sir:

Applicant submits herewith a translation of the International Preliminary Examination Report ("IPER") issued in the corresponding international application. Each reference cited in the IPER has been cited in an Information Disclosure Statement filed by Applicant. The European Patent Office has deemed that claims 1-10 are novel, claims 6, 9 and 10 have inventive step and claims 1-10 have industrial applicability.

Applicant believes no fee is due with this response. However, if a fee is due, please charge our Deposit Account No. 03-2775, under Order No. 13156-00011-US from which the undersigned is authorized to draw.

Respectfully submitted,

By


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PCT

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

Translation

Applicant's or agent's file reference B02/0592PC	FOR FURTHER ACTION See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)	
International application No. PCT/EP2003/013170	International filing date (day/month/year) 24 November 2003 (24.11.2003)	Priority date (day/month/year) 26 November 2002 (26.11.2002)
International Patent Classification (IPC) or national classification and IPC C07C 209/16		
Applicant BASF AKTIENGESELLSCHAFT		

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.
2. This REPORT consists of a total of 8 sheets, including this cover sheet.
☒ This report is also accompanied by ANNEXES, i.e., sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).
These annexes consist of a total of 2 sheets.

3. This report contains indications relating to the following items:

- I ☒ Basis of the report
- II ☐ Priority
- III ☐ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- IV ☒ Lack of unity of invention
- V ☒ Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- VI ☐ Certain documents cited
- VII ☐ Certain defects in the international application
- VIII ☐ Certain observations on the international application

Date of submission of the demand 25 June 2004 (25.06.2004)	Date of completion of this report 23 February 2005 (23.02.2005)
Name and mailing address of the IPEA/EP	Authorized officer
Facsimile No.	Telephone No.

Form PCT/IPBA/409 (cover sheet) (July 1998)

International application No.

PCT/EP2003/013170

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

I. Basis of the report

1. With regard to the elements of the international application:*

- ☐ the international application as originally filed
- ☒ the description: _____, as originally filed
pages _____ 1-8 _____, filed with the demand
pages _____
pages _____, filed with the letter of _____
- ☒ the claims: _____, as originally filed
pages _____
pages _____, as amended (together with any statement under Article 19
pages _____, filed with the demand
pages _____ 1-10 _____, filed with the letter of 21 January 2005 (21.01.2005)
- ☐ the drawings: _____, as originally filed
pages _____
pages _____, filed with the demand
pages _____, filed with the letter of _____
- ☐ the sequence listing part of the description: _____, as originally filed
pages _____
pages _____, filed with the demand
pages _____, filed with the letter of _____

2. With regard to the language, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.
These elements were available or furnished to this Authority in the following language _____ which is:

- ☐ the language of a translation furnished for the purposes of international search (under Rule 23.1(b)).
- ☐ the language of publication of the international application (under Rule 48.3(b)).
- ☐ the language of the translation furnished for the purposes of international preliminary examination (under Rule 55.2 and/or 55.3).

3. With regard to any nucleotide and/or amino acid sequence disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

- ☐ contained in the international application in written form.
- ☐ filed together with the international application in computer readable form.
- ☐ furnished subsequently to this Authority in written form.
- ☐ furnished subsequently to this Authority in computer readable form.
- ☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
- ☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. ☐ The amendments have resulted in the cancellation of:

- ☐ the description, pages _____
- ☐ the claims, Nos. _____
- ☐ the drawings, sheets/fig. _____

5. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(e)).**

* Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rule 70.16 and 70.17).

** Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.

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INTERNATIONAL PRELIMINARY EXAMINATION REPORT

IV. Lack of unity of invention

1. In response to the invitation to restrict or pay additional fees the applicant has:

- ☐ restricted the claims.
- ☒ paid additional fees.
- ☐ paid additional fees under protest.
- ☐ neither restricted nor paid additional fees.

2. ☐ This Authority found that the requirement of unity of invention is not complied with and chose, according to Rule 68.1, not to invite the applicant to restrict or pay additional fees.

3. This Authority considers that the requirement of unity of invention in accordance with Rules 13.1, 13.2 and 13.3 is

- ☐ complied with.
- ☐ not complied with for the following reasons:

4. Consequently, the following parts of the international application were the subject of international preliminary examination in establishing this report:

- ☒ all parts.
- ☐ the parts relating to claims Nos. _____

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International application No.
PCT/EP 03/13170Supplemental Box
(To be used when the space in any of the preceding boxes is not sufficient)

Continuation of IV.

Lack of unity of invention

This Examining Authority has determined that the international application contains multiple inventions or groups of inventions which are not linked by a single general inventive concept (PCT Rule 13.1), as follows:

I. Claims 1 to 4, 9, 10: A method and a reactor for producing alkylamines by reacting C1-C4 alkanols with ammonia in a fixed bed in the presence of a shape-selective fixed-bed catalyst, characterized in that the fixed bed is a single coherent fixed bed and pipes through which coolant is guided in order to regulate the temperature of the fixed bed are provided within this fixed bed.

II. Claim 5: A method of producing alkylamines by reacting C1-C4 alkanols with ammonia in a fixed bed in the presence of a shape-selective fixed bed catalyst, characterized in that some of the feed material is fed to the fixed bed at a location at which there is already reacted reaction mixture which has a higher temperature than the supplied feed material.

III. Claim 6: A method of producing alkylamines by reacting C1-C4 alkanols with ammonia in a fixed bed in the presence of a shape-selective fixed bed catalyst, characterized in that some of the feed material in liquid form is introduced into the reactor in such a way that evaporation takes place on the fixed catalyst bed.

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PCT/EP 03/13170**Supplemental Box**
(To be used when the space in any of the preceding boxes is not sufficient)

Continuation of IV.

IV. Claim 7: A method of producing alkylamines by reacting C1-C4 alkanols with ammonia in a fixed bed in the presence of a shape-selective fixed-bed catalyst, characterized in that the fixed catalyst bed is additionally supplied with a heat-transfer medium that is inert to the reaction products and the feed material and does not significantly influence the activity and selectivity of the catalyst.

The reasons for this are as follows:

In light of the documents cited in the application and in the search report, EP-A-0 534 195 (D1) and EP-A-0 763 519 (D2), the problem addressed by the application can be defined as that of providing improved methods and reactors for producing alkylamines by reacting alkanols with ammonia in the fixed bed. In order to solve this problem, the applicant provides four different methods that are intended to ensure better heat transfer of the reaction and thereby more advantageous product distribution and lower expenditure on apparatus. The solutions proposed in these four different methods are characterized by very different technical features: 1. coolant pipes in the fixed bed, 2. feed location for the feed material in the fixed bed, 3. evaporation of the feed material in liquid form on the catalyst, and 4. additional inert heat-transfer medium, and therefore do not have a common technical feature that links the different methods. Since the problem of heat transfer and its effect in the production of alkylamines by reacting C1-C4 alkanols with ammonia in a fixed bed in the

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(To be used when the space in any of the preceding boxes is not sufficient)

Continuation of: IV.

presence of a shape-selective fixed-bed catalyst are also known (see D1, in particular column 1, line 21 to column 4, line 18; claims 1 to 11 and 20, and figures 1 and 2), the different methods are also not linked by a previously unknown problem to be solved.

The aforementioned groups of claims therefore lack unity of invention under PCT Rule 13.1 and 13.2 both in terms of the special technical features and in terms of the problems solved.

The international search has been carried out for all the aforementioned inventions.

In response to the request to limit the claims and/or pay additional fees under PCT Rule 68.2, the applicant opted to pay all additional examination fees. This written report therefore includes all the inventions claimed in the present application.

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 V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability;
 citations and explanations supporting such statement

1. Statement

Novelty (N)	Claims	1-10	YES
	Claims		NO
Inventive step (IS)	Claims	6, 9, 10	YES
	Claims	1-5, 7, 8	NO
Industrial applicability (IA)	Claims	1-10	YES
	Claims		NO

2. Citations and explanations

This report makes reference to the following documents:

D1: EP 0 534 195

D2: EP 0 763 519

1. Invention I (claims 1-4, 9 and 10)

1.1 Novelty

The method claimed in claim 1 of the present application and the reactor according to claim 4 differ from the method and reactor described in D1 in that a shape-selective catalyst is used in the method and the reactor contains a shape-selective catalyst. The subject matter of claims 1 to 4, 9 and 10 is therefore novel within the meaning of PCT Article 33(2).

1.2 Inventive step

The subject matter of claims 1 to 4 does not involve an inventive step within the meaning of PCT Article 33(3).

The method according to claim 1 and the reactor according to claim 4 differ from the method and reactor disclosed in D1 merely in that a shape-selective catalyst is used in the method and the reactor contains a shape-selective

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catalyst. The use of shape-selective instead of amorphous catalysts for improving the reaction process in chemical reactions is considered a conventional measure for a person skilled in the art, in particular in the present method because a person skilled in the art is already familiar with the use of form-selective catalysts of this type in the production of alkylamines from alkanols and ammonia (see, for example, D2).

The selection of boiling water cooling as the cooling method and the selection of the pressure in the coolant and in the fixed catalyst bed in claims 2 and 3 lie within the scope of what a person skilled in the art routinely does on the basis of familiar considerations. The subject matter of claims 2 and 3 therefore also does not involve an inventive step.

The combination of features contained in dependent claims 9 and 10 with the features of claim 4, to which they refer, does not appear to be obvious from the prior art. Claims 9 and 10 therefore meet the requirements of PCT Article 33(3).

2. Invention 2 (claim 5)

2.1 Novelty

The subject matter of claim 5 is novel within the meaning of PCT Article 33(3).

2.2 Inventive step

The subject matter of claim 5 does not involve an inventive step within the meaning of PCT Article 33(3). In light of D2, which describes the production of methylamines by reacting methanol and ammonia in the fixed

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catalyst bed with a zeolite catalyst and which can be considered the closest prior art, the problem addressed by the application can be defined as that of providing an additional method of producing alkylamines (it should be noted that zeolite catalysts are regarded as shape-selective catalysts). To solve this problem, the applicant provides the method defined in claim 5, which method is characterized in that 30 to 90% of the feed material is fed to the fixed catalyst bed at at least one location at which there is already reacted reaction mixture which has a higher temperature than the supplied feed material. Such a process is a generally conventional standard method for improving the heat transfer in chemical reactions. The method according to claim 5 therefore does not involve an inventive step.

3. Invention 3 (claim 6)

3.1 Novelty

The subject matter of claim 6 is novel within the meaning of PCT Article 33(2).

3.2 Inventive step

The subject matter of claim 6 involves an inventive step within the meaning of PCT Article 33(3).

In light of D2, which describes the production of methylamines by reacting methanol and ammonia in the fixed catalyst bed with a zeolite catalyst and which can be considered the closest prior art, the problem addressed by the application can be defined as that of providing an additional method of producing alkylamines. To solve this problem, the applicant provides the method defined in claim 6, which method is characterized in that some of the feed material in liquid form is introduced into the reactor in such a way that evaporation takes place on the

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fixed catalyst bed. Carrying out the method in this manner is not obvious from the teachings of D1 and/or D2. The method according to claim 6 therefore involves an inventive step.

4. Invention 4 (claims 7 and 8)

4.1 Novelty

The subject matter of claims 7 and 8 is novel within the meaning of PCT Article 33(2).

4.2 Inventive step

The present application fails to meet the requirements of PCT Article 33(1) because the subject matter of claims 7 and 8 does not involve an inventive step within the meaning of PCT Article 33(3).

Claims 7 and 8 relate to a method of producing alkyalamines by reacting alkanols with ammonia in the fixed bed, an additional inert heat-transfer medium (for example, water) being fed to the fixed bed via the reactor feed inlet. The addition of inert compounds such as water or water vapor for improving heat dissipation in chemical processes is a routine measure for a person skilled in the art. The method according to claims 7 and 8 therefore does not involve an inventive step.

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